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ABSTRACT

Addressing the question of how computers can assist language development, this discussion paper presents a broad overview of the potential for computer use across the elementary school language arts curriculum. It begins by listing several questions that must be considered when assessing the usefulness of computers within the language curriculum, then offers language guidelines that can help answer these questions. The main section of the paper explores several classroom applications of the computer: motivational programs, simulations, adventure games, word processing, and data bases. The paper concludes with the observation that the computer has a great deal to offer to language learning and teaching in the elementary school. (HOD)

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Computers and Language

A Computer Discussion Paper

Ian Scott

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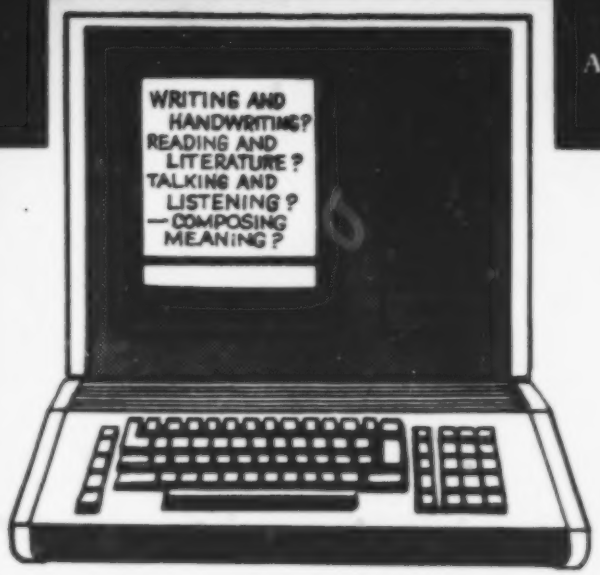
Computers and Language



A Computer Discussion Paper from the Primary English Teaching Association

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How can computers assist language development?

This discussion paper presents a broad overview of the potential for computer use across the Primary School language curriculum. An outline of each application is given, and the benefits of each discussed.

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1. THE QUESTIONS

To assess effectively the usefulness of computers within the language curriculum, a number of questions must be addressed.

- How can computers be used in the language curriculum?
- What demands are placed on the teacher by the use of computers in language?
- What types of computer packages facilitate language development?
- What, if any, negative effects occur, and when do they occur?
- When you have only one computer, how can it be used effectively?

2. LANGUAGE GUIDELINES

To answer these questions by examination of the various applications available requires some criteria for assessment. These are best derived from the basic aims of language teaching in general. With this in mind, the following points have been formulated (with the assistance of Betty Klaosen, Officer-in-Charge, Language Arts Resource Centre, Hobart):

- Language spans the curriculum. It is basic to all learning.
- All language is meaning based – thus a psycholinguistic approach is essential.
- Oral language development is a basis for all other language. Central to the development of all language are the skills of *prediction, discussion, justification* and "storying".
- Language should be developed in its totality, not fragmented. Exercises in isolation are meaningless. To reduce language to segregated skills or subjects denies the learning process.
- Learning to read is a developmental process and should be based on the child's experiences and language patterns. To broaden a child's experience base through reading requires that the child has a *schema* that includes the notion *that you can learn from reading.*
- Children's literature is important in the total language development process. It allows for the enrichment of language patterns and experiences.
- The writing process follows the same developmental process as learning to talk. It is a trial-and-error process which does not emphasise "correctness".
- Children should write about subjects of their own choice, basing their writing on their own experience. Teacher suggestion is valid on an individual or shared experience basis, but not with global topics for all members of the class.

Development of a child's language involves all activities, planned and unplanned.

> *It involves talking, listening, moving, making, thinking, valuing, imagining, remembering, as well as reading, writing, recording.* (**Developing a Language Program**. Education Department of Tasmania, 1982)

With these criteria we shall evaluate the applicability and relevance of the various computer applications to language development. The skills that each strengthens and develops will be explored.

3. THE APPLICATIONS

Although the applications will be treated separately, for reasons of convenience and to assist in their explanation, they should not be viewed as discrete experiences. The software packages allow teachers to use them in many different ways. They facilitate creative and imaginative educational use for both pupil and teacher. It is not essential to exhaust all the potential uses of each package in one unit of work. Teachers should select those activities that are appropriate.

The applications to be explored include general **Motivational Programs**, **Simulations**, **Adventure Games**, **Word Processing** and **Data Bases**. The ideas outlined could be extrapolated easily to other computer applications as they arise. Much of the use of computers in language depends on development of the right attitude to use, as opposed to the development of any special computer technique.

(a) Motivational Programs

These programs are simple, well designed packages that have a lot of potential if the teacher is prepared to plan for their use. Such programs require the teacher to plan and organise a range of activities which draw upon the experiences provided. Usually these programs have limited application, but can enrich certain areas of the language curriculum. They also make a significant contribution to the development of social, cooperative and language skills when small group situations are used.

Examples of programs which facilitate this aspect of computer use include **Facemaker**, **Granny's Garden** and **Podd**. These are designed to motivate children's discussion in various ways. Oral discussion amongst children that involves *prediction*, *discussion* and the *exploration* of language concepts and vocabulary is most desirable in the classroom. Facilitating this may be difficult. These programs allow children to focus on a common task and encourage them to use and develop these oral skills.

As an example of these programs let us look at **Podd**. This is a program that can enrich and extend children's vocabulary and their interest in words. For effective use it requires more time spent in activities *away* from the computer than on it.

> *Podd is a fascinating character who can do many things. When you type a word describing an action such as "run" or "jump", Podd does it. Podd's antics are great fun. But Podd is still a stranger to the world of boys and girls and has not yet had time to learn any actions connected with objects. For example, Podd can't ride a bike or play with a ball or read or write, but Podd does know how to do unusual things entirely alone. Podd actually knows 120 words but isn't going to tell you what they are. You have to find them.* (Quoted from **Podd**, teachers' booklet accompanying package.)

Language is a shared experience. The most successful way to use Podd is to let children work on it in small groups. This allows for discussion amongst the group about which words may work with Podd, as well as ensuring that children share their ideas through explanation with the rest of the group. If used on a one-to-one basis with the computer, Podd is essentially sterile. Much of the benefit of this program occurs through the interaction within the group and the excitement and interest generated as the children discover the words that Podd knows.

Picture courtesy Andrew Malcolm, Bridgewater Primary School (Tas.).

Children quickly realise that some recording mechanism is necessary to keep track of the words which work, as well as those which don't. Such a list quickly becomes grouped under various classifications, in order to make easier the task of finding 120 words. Such classifications change as the children realise the various relationships which exist between words. Such relationships include *synonyms* and *antonyms*. Children will also be keen to produce illustrated books of their favourite Podd actions.

As the lists lengthen, children become intrigued with the words which they have found do not work. They become interested in extending the activities of Podd into other situations. This can be translated into word searches to describe, for instance, things that Podd could do on a bushwalk, in town, at school and so on. The words used to describe these activities are hunted out and listed for use with children's *own* Podd, usually a model they have made themselves, in media such as plasticine, fabric, and balloons, as well as puppets. Such models make possible further work in developing scenarios for the Podds to display all the words found. At one school, Blackmans Bay (Tasmania), this resulted in a "Poddland" – a world of model Podds in a range of situations to illustrate all the words found.

Children are keen to write explanations for the appearance of Podd, where it came from and what its purpose or mission is. This can lead to story writing and book production. Allowing children to create imaginative explanations for Podd's appearance, to describe the journey to earth, and Podd's experiences with people are all very worthwhile activities.

Such use requires little computer time, since children work in groups and may engage in many activities that do not require the computer at all.

There are other more open-ended applications which allow for language development, as well as encompassing other curriculum areas, allowing an **across-the-curriculum** approach. These include broader applications such as **Adventure Games**, **Simulations**, **Data Bases** and **Word Processing**.

Language

- Oral reporting and discussion (as a group and as a class) of events and problems encountered within the program.
- Diaries of experiences on the island can be kept.
- Stories of survival on the island can be written and illustrated for others.
- Search literature for fictional and factual accounts of other survivors, e.g. Apollo 13, Mawson in Antarctica. Read and discuss with the class.
- Communication. What methods of effective communication are available for signalling for help?
- What would the groups do to survive in a different situation? Speculate on survival strategies within these, e.g. the bomb is dropped, trapped on the moon, stuck in a cave.
- If you could prepare yourself for the island ordeal, what would you take? Restrictions such as amount of space, weight etc. can be given.

Mathematics

- 3-D space constructions, e.g. huts, boats.
- Design huts, boats, etc. Could be real designs or fantastic "dream huts".
- Models of terrain, buildings, huts, boats, island.
- Compass use.
- Map reading, map making, use of scale, contours, etc.
- Personal measurement of walking speeds over distance. Could include pace measurement, time trials on different terrain, graphing, postulating into other situations.

Cross Curriculum Activities
based on
ADVENTURE ISLAND
Survival Simulation
You are washed up on an island about which you know nothing.
What will you and your companions do? How will you survive?

Drama

- Storybuilding — of experiences within the program or stories developed from it.
- Storytelling — of program experiences or stories developed from ideas within these experiences.
- Expressive movement — to music, to express feelings, to describe occurrences on the island.
- Role playing — investigating roles developed within the program, group dynamics, relationships.
- Interview games — class as reporters can interview those survivors from the island who "make it". They can then report the story. Compare reports.
- Groups can play games of justifying their right to survival, e.g. "Four in a basket and one must go" — which one?

Art/Craft

- Illustrate maps made.
- Indigenous art — what's that?
- Draw or paint people/situations/places met.
- Graphic communication.
- Body language — how to say "Help". Communication where speech is impossible, e.g. when scuba diving.
- Invent fictitious animals. Draw them, describe them, model them.
- Draw an animal from real life.
- Draw yourself as an island survivor — at the beginning and successful end of your ordeal.

(b) Simulations

Simulations are special computer programs which emulate real-life situations. These programs enable children to interact with the situation and effect changes to it. Simulations are usually constructed about experiences which are impossible, impractical or too dangerous to undertake in the classroom. Their use enables teachers to provide experiences in a wide range of activities for their class. Such activities could include tackling the Oregon Trail, exploring an archaeological find, surviving on a desert island or discovering and settling an unknown land.

Simulations offer teachers a means of broadening and enriching children's experiences. This kind of learning can be achieved through the use of excursions or other motivating experiences, but, unfortunately, we cannot take excursions whenever and wherever we like. Additionally, things learnt on an excursion cannot be trialled or tested again, since it is usually a "one-off" experience. With simulations, much experimenting of this nature can be carried out. Such enrichment provides a wide variety of language and experiences upon which children can draw for later work.

Simulations are best tackled in small groups, tasks being determined by the particular program. Situations or problems that are not successfully dealt with can be "re-lived" when appropriate. The group actively engages in *discussion, planning, prediction, hypothesis formulation and testing, justification and review*, both orally and in written form, throughout the program.

When first introduced to the program, these kinds of skills may be rarely exercised. Children quickly realise (without teachers telling them!) that planning is important to maximise their effect during the program. While playing, they begin to review constantly all their previous experiences in order to assess their reactions to situations they meet. As a group, they require much discussion and justification for particular actions before they will proceed. They begin to develop theories about "why" and "what" will happen. They will reason carefully the "pros" and "cons" of each choice they are given. Recording becomes essential to success. Some division of labour will naturally occur, although tasks will be swapped around to ensure that all members have a "turn".

This type of activity provides a great many opportunities for a wide variety of oral language to be used. It involves learning to cooperate, listen, put forward a point of view, accept compromises and work towards a common goal.

There are necessarily a great many additional activities undertaken away from the computer — activities which consolidate, extend and enhance the experiences of the situation. Such activities may include recording the experience in a log book, story telling, story writing, role playing, art and craft, research and modelling. The extent and type of activities are determined by the aims of the teacher for the class using the program, and the focus of the program itself. These can be developed into the areas of application desired by the teacher, with little trouble, since the natural motivation will carry students into a wide range of topics.

As an example, the program **Adventure Island** offers the opportunity for students to experience the problems of survival on a seemingly uninhabited island. They find themselves cast up on the island in a small group and their task is simply to survive. They may fail many times before learning the techniques necessary to ensure their survival.

The theme map provided gives an indication of the extent to which this type of program can be used, in language as well as in activities across the broad curriculum. Teachers may elect to use these packages simply as a theme for language arts, or in a much wider sense. Such decisions are entirely based on the teachers' experience and approach.

Simulations offer real advantages to teachers by providing an alternative and unique opportunity to broaden childrens' experience base. They also allow for

Science

- Human biology. Basic functioning and nutrition essential for survival.
- Fitness testing and evaluation.
- Bushcraft skills. Eating from the seashore and bush. What is available? How do you catch it? Making fire and shelter. Finding your way.
- Shelter construction in different cultures.
- Island animal populations. Differences, special problems. How do they get there?
- Technology and "future shock".
- Plant and Animal classification and identification.
- Basic survival skills and principles. Extend to knowledge of present day technology. Could you make electricity? Fuels? Simple tools?
- Modern navigational aids – uses and principles of design. Compare with devices used for same purpose throughout history.

Social Science

- Discuss community interdependence — good or bad? How dependent are we on other individuals? Laws — Formulate rules for the group on the island. Are they necessary? Had this been done already?
- Shipwrecks; smugglers; stories; means; survival. Discuss some of the true survival stories.
- Staple diets — of various cultures.
- Survival diets. What things are essential?
- Luxury foods. Are they the same in all cultures?
- Islands — their special status. Ecology, problems, life on an island. Types of islands (coral, atoll, volcanic).
- Environmental issues regarding island survival, ecology, economics.
- The arms race — nuclear weaponry. Examine local issues and feelings.
- "Culture shock", culture clash. Examine the effects of two cultures upon meeting. Children can postulate their reactions to a future society, a past society, a different culture.

a wide range of language activities to be explored. Teachers need to exercise care and discretion when assisting children starting a simulation or adventure game . Such intervention will depend upon a number of variables, such as the age of the class, the children's previous experience with such programs, the different abilities of individual pupils, the teacher's understanding of the program, and so on.

(c) Adventure Games

Adventure games, or interactive fiction, are re-creations of *fictional* worlds or situations on the computer. They are very similar to simulations in their format, style and place in the classroom, but offer a fictional base for work. They allow children to become involved in a wide range of imaginative (even fantastic) situations. For instance, they may have to save a planet from extinction, assist a king and queen in their fight against a wicked witch, or complete a survey mission in time to return to earth.

Such programs allow children to become involved in a very real way with highly imaginative experiences. Their presence is essential to the whole story and their decisions will affect the outcomes experienced by them. When children use such programs, it is as though they have been to another planet or have actually helped rulers overcome witches. These experiences are as "real" to them as any other.

Such programs provide opportunities for enriched language work in story telling, story building, recording and writing. They also provide a unique opportunity for exploring role-playing with children. Since their individual experiences on the computer are "realistic" and involving, children will assume roles without any direction from the teacher to do so. This enables the teacher to use such programs as starting points for an investigation of such roles to a greater degree through a wide range of **drama** activities.

The advantages of such programs are essentially the same as for simulations. With the added attraction of a fictional base, children can be encouraged to let their imaginations go!

As an example of some good simulations, teachers should look at the 4-mat company's programs **Granny's Garden** and **Flowers of Crystal**. The video **Flowers for the teacher**, which accompanies the latter, provides an excellent illustration of the potential offered by such programs.

An increasing number of computer programs provide a direct link to some classics of literature. An excellent example of this is **Hobbit** based on the book by J.R.R. Tolkien. This is available for use with a variety of computers.

(d) Data Bases

A **Data Base** is a collection of information on a particular topic. For example, the names and addresses of the pupils in your class, or information on early Australian explorers, could form a data base. Data bases enable the user to "access" information in a wide variety of ways. Through them, children have ready access to data which might have been difficult or impossible to locate, using more conventional means. Computers offer children the power to manipulate and interrogate such data with an ease which is conducive to development of higher-order skills such as **making and testing hypotheses, interpreting and analysing results, presenting the conclusions** and **discussing alternatives**. Data bases make extra time for such higher-order activities to become possible because, through them, children spend far less time in having to *locate* basic material or data in the first place.

As data bases are concerned with the storage and use of information, they are applicable to a wide range of subjects and activities. They can serve to complement and enrich studies in many topics and interests. They are often used, with other software, in a thematic or across-the-curriculum manner. Students can also develop their own data bases.

"Fixed" data bases are becoming available for schools in growing numbers. These data bases contain information which the user can access in a variety of ways but cannot change. Examples of these are **The First Fleet Data base** (which contains information on the convicts in the First Fleet), the **Atlas** data base (which contains a wide variety of data on different countries) and the **Somerleyton Census Data** (which contains the 1851 census data for the small English village of Somerleyton).

Reading for information can be assisted through the introduction and use of "shell" data bases. "Shell" data bases are those which permit the user to *define* the format under which data will be entered and stored. This serves two purposes. First, children need to understand and be able to use data bases as sources of information. Second, once understood they can be used to encourage a number of language activities. For example, how about collecting a data base of book reviews for use by children in your class or school? These can be added to as children complete more reviews. If care is taken with setting it up, children will be able to interrogate the data base to locate, for example, an adventure story, a book about cats, or one by their favourite author. They could read the review and then decide whether or not to read the book. Consider having children create fictional characters or describe them from books they have read. These can then form a data base for use by children to provide motivation for writing ideas or reading possibilities. Such data base use encourages language activity and acts as a resource to support it.

Many different skills are addressed both directly and indirectly when children set out to define and create their own data bases. This is a most exciting application, for it not only involves children in learning to search data bases for information but it also involves them in creating ones that are relevant to the work they are doing in the classroom.

The range of ideas and topics which classes might use as the basis for their own data bases is virtually unlimited and can encompass a wide variety of subjects. Students and teachers will derive a great deal of satisfaction and pleasure from the creation and use of such applications, provided they are relevant to the curriculum.

Some suggestions:

- Create a data base on **pets**.
- Create a data base on **hobbies**.
- Create an **Australian Explorers** data base.
- Create a data base on **children's writing**. This would allow pupils to find and read stories written by their peers on particular topics.
- If you are taking a particular class over two or three years, why not allow each child to create a **personal data base** which stores information which can be referred to over the course of the child's time in your class. This could include such data as monthly measure of height, weight, shoe size and so on. Children could produce graphs of this data at any time they like.
- Why not consider **long range data** collection? This might involve, for instance, children setting up their own weather station and collecting meteorological data at regular intervals. After a number of years pupils would be able to study valuable data collected by past pupils, to which they may continue to add, on an on-going basis, during their own time at the school.

Needless to say, the kinds of data bases you decide to initiate and create in your own class will offer a wide range of language and learning experiences. These will often be a springboard or focus for a great diversity of rich and stimulating activities over a wide range of topics across the whole curriculum.

(e) Word Processing

Writing is a means of communication, a very visible and enduring medium, the teaching of which is undergoing dramatic transformation. The "process-conference" approach to writing has changed the philosophical basis upon which written language is taught in schools. Children are now encouraged to record their thoughts, emotions and experiences without necessarily being concerned, in the initial stages, about the accepted conventions of "finished" writing. They are no longer expected to produce a "finished" piece in a single attempt.

Word processing brings alive the "process" approach to writing by letting the writer "play" with written language in a way which is very similar to the way in which the spoken word is explored. It removes much of the drudgery involved in making editorial corrections. A word processor lets the writer process words, by manipulating whole passages of text or individual words, moving them, physically, anywhere within the document or removing them at the touch of a key.

Advantages of word processing

Children are quick to see the inherent advantages of the word processor. Some of these are as follows.

- Ideas and suggestions can be quickly tried, discussed and altered on the screen. This swift "review" function is an important and powerful aspect of word processing.
- Experimenting with and entertaining a variety of alternative courses of action becomes feasible because of the ease with which changes can be made.
- Proof reading is greatly simplified for some children, simply because what they have written is so easy to read on the screen. Poor handwriting is no longer a barrier to self expression.
- All children are able to produce work which is legible and looks good.
- The user is able to explore a variety of styles for presentation of work by, for example, varying the widths of some sections of the work, indenting paragraphs, printing out the text in italics and so on.
- Errors are easily corrected; they are no longer thought of as being fixed and ever-visible reminders of mistakes made.
- A word processor makes the user the master of the written word.

Depending upon the age of the students, a simple demonstration of some of the capabilities of the word processor is all that is required, initially. The next step is to let them use it. Adults generally tend to be cautious and conservative. By contrast, children are relatively uninhibited in their use of the word processor and soon demand to be shown how to use more advanced features.

The fundamental approach to introducing word processing is little different to that required for anything else. Begin simply and let the children use the machine as early as possible. Introduce new features as and when they are required by the individual.

Of great importance to the successful introduction and implementation of a word processing programme is teacher preparation. Unless teachers are familiar with the machine and confident in its operation they will not be in a position to comprehend quickly a particular problem a child may be experiencing and to find the appropriate solution.

Effective use of the word processor may require the teacher to change some classroom practices. The writers believe it is important that, right from the beginning, teachers ensure that children compose directly on the keyboard. It is equally important that children be encouraged to leave correction of errors until later.

Many children (and adults) feel that once something has been committed to paper it is "finished". They are reluctant to make substantial changes and unwilling to accept many suggestions for alterations. Children composing directly into the machine soon realise that changes are easily made and, thus, they become more flexible in their editing and writing processes. They are, in fact, more likely to make substantial changes to their work rather than being content with relatively minor alterations. This may involve "playing" or experimenting by testing and trying out various words, sentences or phrases on the screen.

How word processing benefits students:

- They develop an increasing awareness that story writing is part of a continuum.
- They show an increasing awareness of the "sound" of the story for the listener; their sense of audience is reflected in their concern for how the story reads, whether the meaning is clear and if there are errors.
- They become concerned to produce correct spelling. This is made evident through greater care when proof reading. Recognition of errors by children has been observed to be as high as 90%. Errors are corrected, where possible, by the child, with assistance from the teacher and other sources where required.

The development of these skills comes about as a result of the children's readiness to accept assistance when they are ready to "polish" and refine their work, and because of the anticipated pleasure and enjoyment that is derived when the work is read by others.

Ideally each pupil in the class should have his or her own word processor, in the same way that he/she has his/her own pen and books. That ideal is not, at present, attainable. The reality in many classrooms is that children may have access to only one computer, and for varying amounts of time. When all children have their own machines then much of what has been stated previously might be attainable.

Nevertheless, by adopting some alternative strategies, and making some compromises, some benefits will result. Limited resources have always challenged teachers to consider various strategies. One effective way in which a number of children can take advantage of a word processor is by letting them work together in small groups. As a particular group concludes its session, the work can be "saved" on disk, to be printed out at a convenient time. The next group then moves out for its turn. At the next session the first group continues with its work. Even though the experience may not be repeated frequently, a number of teachers have commented on the positive effects even such limited experiences have had on the attitude of individuals towards their written work and enhancement of self esteem.

Two or three children composing together at the keyboard are practising and developing a number of skills. While composing their work, a great deal of **discussing, hypothesising, arguing, debating, "storying"** and **"conferencing"** takes place. This interaction enriches both spoken and written work. A great deal of social interaction and cooperative behaviour is also required if the group is to complete its task. Contrary to some beliefs, the computer can do much to develop and enhance social interaction.

It remains the responsibility of the class teacher to decide how to deploy and use a relatively scarce resource effectively. Quite often this means restricting access to a small number of students, according to pre-determined criteria. It is impossible to have all children in a class share one computer and do all their written work on it. Some teachers may feel that this is a goal that should be attainable but isn't, because of some failing on their part. This is simply not true. However, careful and thoughtful classroom organisation will enable maximum utilisation of available resources. For example, consider allowing small groups of two or three to use the word processor. As the children complete their session, their work can be "saved" on the disk to be printed out later at a convenient time. Another group can now use the machine while the first group is reviewing and discussing its own work.

Ideas for use of the word processor.

Teachers will find no difficulty in deciding upon practical uses for the word processor. A few suggestions are provided below.

- Following the return of the class from an excursion, children can use the word processor to make **books**, illustrating them with paintings, drawings or photographs taken during the trip.
- **Write an article for a newspaper/television station/radio station news report, based on some personal experience.**
- Produce **newsletters**.
- **Create information sheets** on special interests.
- **Publish a class newspaper.**
- **Create and publish "shape" poems.**

The applications for the word processor are wide-ranging. It may be used anywhere written work is required and in areas not previously considered. But, where it is used, the results are sure to be interesting and exciting!

CONCLUSION

In conclusion, we can say confidently that the computer has a great deal to offer to language learning and teaching in the primary school. The types of programs discussed can facilitate language development over a broad range of areas. Motivational programs are more specifically targeted while simulations and adventure games allow for a totally integrated approach. These broader applications offer real potential for unique educational alternatives within classrooms.

The demands made on the classroom teacher to use such programs properly are no different to those involved in any other thematic preparation and organisation. The attitude of the teacher is important, as is enough experience to make full use of the unique opportunities afforded.

The availability of the computer within a school is often restricted. From the above discussion it can be seen that the computer offers a usefulness that is not centred on itself, but rather on some common task or goal. This allows for thematic or across-the-curriculum approaches to be successfully explored. One computer in the classroom will realistically offer many benefits. The only area where this is not the case is with word processing. In this area, limitations on computer availability will mean teachers will have to make decisions about its use within the classroom. Even so, word processing can offer an alternative means of enhancing the process of learning to write.

The negative effects of computers in the language curriculum include the inappropriate use of programs, the use of undesirable programs (such as "electronic grammar book" programs) and the abdication of responsibility towards computer-use, as when children are directed to use computers without being given clear aims, purposes, teacher involvement or direction. Teachers, as a professional group, would find such practices untenable in other areas, yet somehow have different standards for computer-use, in some places.

Computers offer many unique possibilities to enhance and enrich the modern language curriculum. They have the potential to extend conventional classroom aims into realms previously considered impossible.

Software references

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